

We claim

1. A pass/fail judgment device comprising:

a discriminant function computing unit for computing discriminant functions which give variables used to separate the frequency distributions of pass category and fail category from a plurality of pieces of parameter information which make pass/fail judgment factors and pass/fail judgment result information thereof;

a statistical parameter computing unit for computing the center of distribution and distribution parameters indicating the breadth of the distribution for said variables with respect to either or both of said pass category and fail category;

a threshold determining unit for taking as a threshold for pass/fail judgment the value of said variable which gives a specific distribution probability in either or both of said categories based on said center of distribution and distribution parameters;

a parameter information acquiring unit for acquiring a plurality of pieces of parameter information on pass/fail judgment objects; and

a pass/fail judging unit for comparing the value of said variable obtained by substituting the parameter information into said discriminant function with said threshold and thereby makes pass/fail judgment.

2. The pass/fail judgment device according to Claim 1, wherein

said statistical parameter computing unit computes the mean and standard deviation of fail category, and

said threshold determining unit takes as said threshold said variable value equivalent to a value which is away from said mean of fail category by a constant multiple of the standard deviation thereof.

3. The pass/fail judgment device according to Claim 2, wherein

said statistical parameter computing unit computes the mean and standard deviation of pass category, and

said threshold determining unit judges by what multiple of the standard deviation the threshold determined by said mean and standard deviation of fail category is away from said mean of pass category, and thereby computes a rate of occurrence of overcontrol with that threshold.

4. The pass/fail judgment device according to Claim 1, wherein

a plurality of pieces of said parameter information is obtained by converting specified inspection data obtained as the result of inspecting a plurality of pass/fail judgment objects with a specified inspecting instrument in advance into parameters which represent different pass/fail judgment factors by a plurality of different conversion expressions, and is stored in a specified storage medium, and

a plurality of pieces of parameter information on pass/fail judgment objects acquired by said parameter information acquiring unit and the results of pass/fail judgment

by said pass/fail judging unit are additionally stored in the specified storage medium.

5. The pass/fail judgment device according to Claim 4, wherein the judgment device comprises a unit for inputting the results of visual pass/fail judgment on said pass/fail judgment objects,

said pass/fail judgment result information indicating the results of said visual pass/fail judgment is correlated with the parameter information on said pass/fail judgment objects, and

if the results of pass/fail judgment by said pass/fail judging unit and the results of said visual pass/fail judgment are discrepant from each other, the results of the visual pass/fail judgment are additionally stored as correct judgment results in said specified storage medium.

6. The pass/fail judgment device according to Claim 4, wherein the judgment device comprises a unit for inputting the causes for visual pass/fail judgment and the results of the visual pass/fail judgment on said pass/fail judgment objects,

either or both of said pass category and fail category are subdivided by cause for the pass/fail judgment and taken as said pass/fail judgment result information, and

said discriminant function computing unit computes discriminant functions which give variables which separate the frequency distributions of the subdivided pass category and fail

category.

7. The pass/fail judgment device according to any of Claim 1, wherein

in computing discriminant functions having as a variable any of a plurality of said parameters, the discriminant function computing unit computes correlation coefficients between the parameters, counts the number of parameters which give a correlation coefficient not less than a predetermined value in said pass category and fail category, disuses parameters having a high count, and repeats this processing to eliminate multicollinearity.

8. The pass/fail judgment device according to Claim 1, wherein

in computing discriminant functions having as a variable any of a plurality of said parameters, said discriminant function computing unit disuses parameters in increasing order of priorities given to the parameters in advance, and repeats this processing to eliminate multicollinearity.

9. The pass/fail judgment device according to Claim 1, wherein

the judgment device comprises:

an electromagnetic wave applying unit for irradiating pass/fail judgment objects with predetermined electromagnetic waves;

an electromagnetic wave detecting unit for detecting reflected electromagnetic waves or transmitted electromagnetic

waves produced as the result of the application of the electromagnetic waves; and

an electromagnetic wave data generating unit for generating electromagnetic wave data from the detection values of reflected electromagnetic waves or transmitted electromagnetic waves detected by the electromagnetic wave detecting unit, and

said discriminant function computing unit and said parameter information acquiring unit substitute said electromagnetic wave data into a plurality of different conversion expressions to compute values corresponding to the forms of pass/fail judgment objects, and take the computed values as a plurality of pieces of said parameter information.

10. The pass/fail judgment device according to Claim 9, wherein the judgment device comprises:

a positional information acquiring unit for acquiring positional information on pass/fail judgment objects; and

an arrangement analyzing unit for, when electromagnetic waves reflected by a plurality of pass/fail judgment objects more than once are detected by said electromagnetic wave detecting unit, grasping the arrangement of the pass/fail judgment objects from said positional information, and

said discriminant function computing unit disuses or gives lower priorities to said parameters to which said electromagnetic waves reflected more than once greatly contribute.

11. A pass/fail judgment program wherein the judgment program causes a computer to carry out

a discriminant function computing function of computing discriminant functions which give variables which separate the frequency distributions of pass category and fail category from a plurality of pieces of parameter information which make pass/fail judgment factors and pass/fail judgment result information thereof;

a statistical parameter computing function of computing distribution parameters indicating the center of distribution for said variable and distribution parameters indicating the breadth of the distribution in either or both of said pass category and fail category;

a threshold determining function of taking as a threshold for pass/fail judgment said variable value which gives a specific distribution probability in either or both of said categories based on said center of distribution and distribution parameters;

a parameter information acquiring function of acquiring a plurality of pieces of said parameter information on pass/fail judgment objects; and

a pass/fail judging function of comparing the value of said variable obtained by substituting the parameter information into said discriminant functions with said threshold and thereby making pass/fail judgment.

12. A pass/fail judgment method wherein the judgment method comprises;

a discriminant function computing process in which discriminant functions which give variables which separate the frequency distributions of pass category and fail category are computed from a plurality of pieces of parameter information which make pass/fail judgment factors and pass/fail judgment result information thereof;

a statistical parameter computing process in which the center of distribution and distribution parameters indicating the breadth of the distribution for said variable are computed with respect to either or both of said pass category and fail category;

a threshold determining process in which said variable value which gives a specific distribution probability in either or both of said categories is taken as a threshold for pass/fail judgment based on said center of distribution and distribution parameters;

a parameter information acquiring process in which a plurality of pieces of said parameter information on pass/fail judgment objects are acquired; and

a pass/fail judging process in which the value of said variable obtained by substituting the parameter information into said discriminant function is compared with said threshold, and pass/fail judgment is thereby made.

13. A multivariate statistics analyzer which is capable of

communication of data with the outside through a communication interface and executes a multivariate analysis program under the control of a predetermined operating system, wherein

said multivariate statistics analyzer comprises a hard disk drive which is capable of accumulating the multivariate analysis program and transmitting, receiving, and accumulating data,

said multivariate analysis program comprises modules corresponding to

a mode classifying portion which includes parameter value data consisting of parameter values which are correlated with at least pass/fail judgment result data when data is externally acquired through said communication interface and stored in said hard disk drive and are actually computed with respect to each component, and subdivides categories based on the accumulated data;

a discriminant function computing portion which eliminates multicollinearity and further computes discriminant functions based on said parameter value data;

a statistical parameter computing portion which computes statistical parameters including the mean and standard deviation in the frequency distributions of pass category and fail category with respect to said discriminant functions; and

a threshold determining portion which utilizes the statistical parameters to determine a threshold, and

the threshold determining portion performs the operations of

acquiring said discriminant function data, said parameter value data, and pass/fail judgment result data to make pass/fail judgment, and generating a histogram corresponding to the judgment result on a category-by-category basis;

computing the mean and standard deviation of each category in the thus generated histogram; and

determining the threshold of a discriminant function corresponding to a specified rate of flowout which is set for fail category and indicates the range in which defective units are let out, based on the mean and standard deviation computed in fail category and the rate of flowout.

14. The multivariate statistics analyzer according to Claim 13, wherein

said threshold determining portion is externally fed with said rate of flowout and determines the threshold of said discriminant function so that the inputted rate of flowout will be obtained.

15. The multivariate statistics analyzer according to Claim 14, wherein

said threshold determining portion determines as a threshold the range from the mean to four times the standard deviation which is considered to be the range corresponding to said rate of flowout.

16. The multivariate statistics analyzer according to Claim 13,

wherein

said threshold determining portion judges the suitability of said determined threshold of discriminant function based on the mean and standard deviation computed in pass category and a specified rate of overcontrol which is set for pass category and indicates the range in which non-defective units are judged as defective units.

17. The multivariate statistics analyzer according to Claim 16, wherein

said threshold determining portion judges the suitability of said threshold depending on whether the threshold falls in the range from the mean to nine times the standard deviation which is considered to be the range corresponding to said rate of overcontrol.